PA 51/49T26

USSR/Electronics May/Jun 49
Telemechanics

"Stability of Periodic Motions for the Case When One Root is Equal to Zero," S. V. Kalinin, Moscow, Inst of Mech, Acad Sci USSR, 6 pp

"Prikl Matemat i Mekh" Vol XIII, No 3, 1949

In a previous article (S. V. Kalinin, "Prikladnaya Matematika i Mekhanika," Vol XII, No 5, 1948) a method was used for critical case when [illegible] equation of first approximation had one zero characteristic number while it was assumed that lowest degree of x in expansion of functions [illegible]

51/49T26

USSR/Electronics (Contd) May/Jun 49

entering right-hand side of equation was equal to two. Considers more general case when this degree may be any integral number. Submitted 9 Mar 49.

51/49T26

KALININ, S. V.

KALININ, S. V.

168T26

USSR/Engineering - Hydrodynamics Jul 50

"Flow With Separation Around Obstacles in the Shape of Second-Order Curves," S. V. Kalinin

"Iz Ak Nauk SSSR, Otdel Tekh Nauk" No 7, pp 966-983

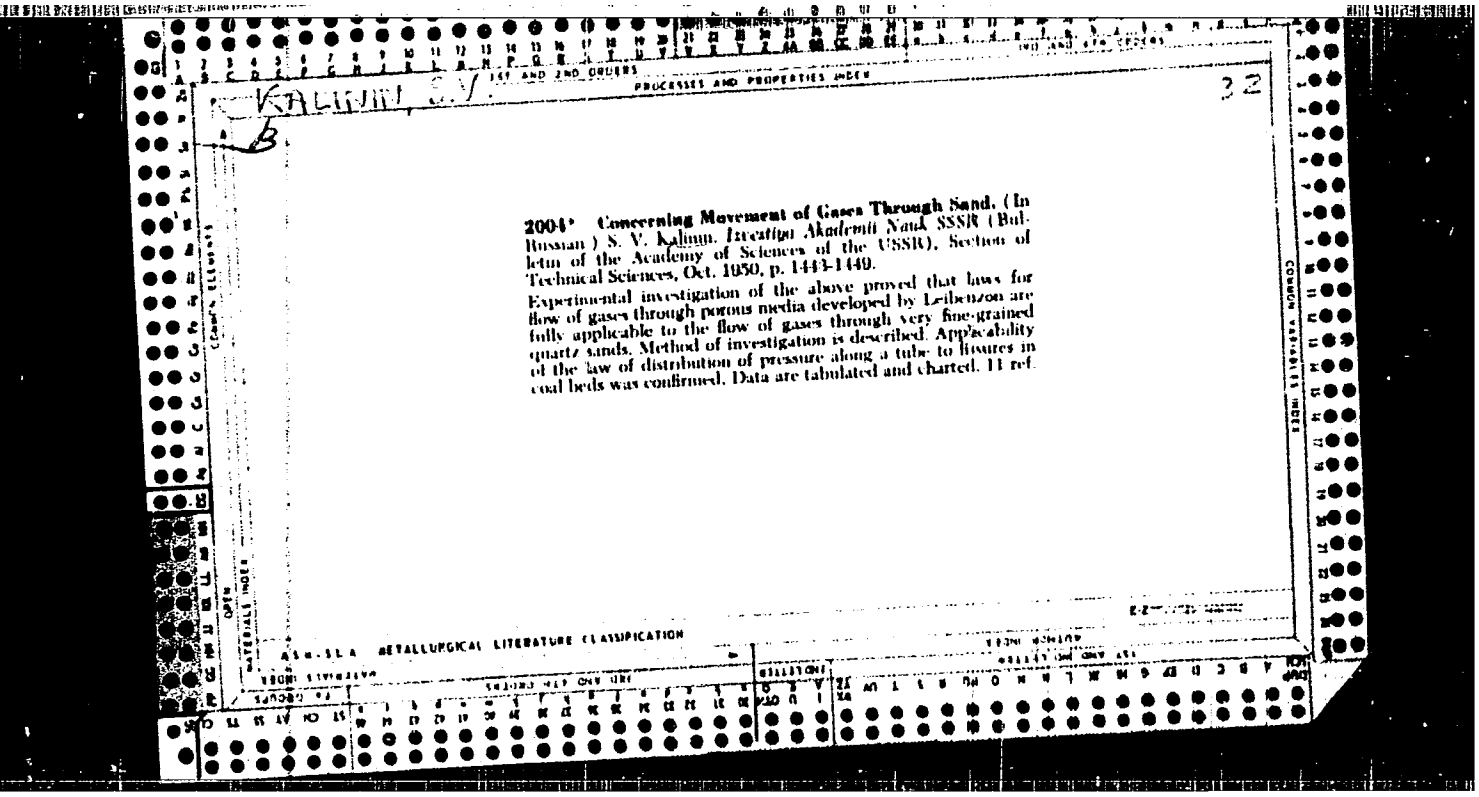
Applies A. I. Nekrasov method to subject case and shows possible solution for entire group of second-order curves. Solves for circle, ellipse, parabola, hyperbola, by changing only one parameter taken from equation of curve. Nekrasov method permits development of differential equations of

168T26

USSR/Engineering - Hydrodynamics (Contd) Jul 50

Free flows, determination of radius of curvature calcualtion of value of total pressure of flow on obstacle. Submitted by Acad A. I. Nekrasov.

168T26



KALININ, S. V.

PROCESSES AND PROPERTIES INDEX

22

2004* Concerning Movement of Gases Through Sand. (In Russian) S. V. Kalinin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1443-1449.

Experimental investigation of the above proved that laws for flow of gases through porous media developed by Leibenzon are fully applicable to the flow of gases through very fine-grained quartz sands. Method of investigation is described. Applicability of the law of distribution of pressure along a tube to fissures in coal beds was confirmed. Data are tabulated and charted. 11 ref.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION

KALININ, Stepan Vasil'yevich (Mos State Univ imeni Lomonosov) awarded sci degree of Doc of Physical-Mathematical Sci for 27 Jun 57 defense of dissertation: "On the stability of periodic movements in critical cases" at the Council, Inst of Mechanics, AS, USSR; Prot No 2, 18 Jan 58. (BMVO, 6-58, 12)

KALININ S.V.

AUTHOR: Kalinin, S.V.

24-8-34/34

TITLE: 100th anniversary of the birth of A. M. Lyapunov. (Stoletiye so dnya rozhdeniya A. M. Lyapunova).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.8, p.168 (U.S.S.R.)

ABSTRACT: Report on a meeting to commemorate the 100th anniversary of this well known Russian mathematician held jointly by the Presidium of the Ac.Sc. and by the various other scientific bodies. This anniversary was also used as an occasion for organising meetings, exhibitions and publishing transactions by various branches of the Ac.Sc.

AVAILABLE: Library of Congress

Card 1/1

AUTHOR:

TITLE: On the Stability of the Periodic Motions in the critical Case in which the Characteristic Equation has a Pair of Imaginary Radicals (Simplified Method), (Ob ustoychivosti periodicheskikh dvizeniy v kriticheskom sluchaye, kogda charakteristicheskoye uravneniye imeet odnu paru chisto mnimykh korney (Uproshcheniyy metod)).

PA - 2218

PERIODICAL: Prikladnaia Matematika i Mekhanika, 1957, Vol 21, Nr 1, pp125-128 (U.S.S.R.)

Received 3/1957 Reviewed 5/1957

ABSTRACT: May the equations of the distrubed motions be assumed to have the following form: $dx/dt = -\lambda y + X$, $dy/dt = \lambda x + Y$, $dx_s/dt = p_{s1}x_1 + \ldots + p_{sn}x_n + X_s$ $(s = 1,\ldots,n)$. Here denotes a constant number, and the periodic coefficients p_{sr} are determined by the formulae $p_{sr} = o_{sr} + \varepsilon f_{sr}(t)$, and $o_{sr} = (1/\omega)\int_0^\omega P_{sr}(t)dt$. here f_{sr} denotes the periodic functions of t with the period ω. The functions X, Y, and X_s have terms of an order that is higher than the second with respect to the variables x, y, and x_s. The above equations are then averaged over a period of the periodic coefficients of the system. The characteristic equation of the system of the averaged equations have two purely imaginary radicals $\pm i\lambda$. The averaged equation is then transformed by the substitution $x = r\cos\theta$ and $y = r\sin\theta$, and by a further transformation θ is then introduced as an independent variable instead of t. If the initial value of r is equal to zero, r will be equal to zero for all values of θ. As long as the absolute values of r and x_s are sufficiently small, r will retain its initial sign.

Card 1/2

AUTHOR: Kalinin, S.V. (Moscow) SOV/24-58-4-21/39

TITLE: On the Stability of Motion of an Aircraft with an Autopilot (Ob ustoychivosti dvizheniya samoleta s avtopilotom)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 4, pp 114 - 117 (USSR)

ABSTRACT: The author (Refs 1, 2) has described earlier a method of solving the problem of the stability of periodic motions for the case of one zero root. Later, the author published (Refs 3,5) the solution for a pair of purely imaginary roots. The present note applies the above methods to the problem of the stability of motion of an aircraft with an autopilot in these critical cases. In both cases the stability is discussed by constructing the appropriate Lyapunov function. There are 8 Soviet references.

SUBMITTED: July 24, 1957

Card 1/1

KALININ, S. V.

The First All-Union Congress on Analytic and Applied Mechanics.
Vest.Mosk.un.Ser.1: Mat., mekh. 15 no.3:76-77 My-Je '60.
(MIRA 13:10)

(Mechanics, Analytic--Congresses)
(Mechanics, Applied--Congresses)

KALININ, S.V. (Moskva)

Stability of periodic m tions in some critical cases. Izv. AN SSSR. Otd.tekh.nauk.Mekh. i mashinostr. no.4:79-89 Jl-Ag '61. (MIRA 14:8)

(Motion)

KALININ, S.V. (Moskva)

Stability of periodic motions in case of some null, pure imaginary roots and roots with negative real parts. Izv.AN SSSR.Otd.tekh.-nauk.Mekh.i mashinostr. no.6:167-169 N-D '61. (MIRA 14:11)
(Motion)

AMINOV, M.Sh., red.; BOGOYAVLENSKIY, A.A., red.; KALININ, S.V., red.; KUZ'MIN, P A., red.; LUR'YE, A.I., red.; MATROSOV, V.M., red.; RUMYANTSEV, V.V., red.; SRETENSKIY, L.N., red.

[Proceedings of the interuniversity conference on the applied theory of the stability of motion and on analytic mechanics] Trudy Mezhvuzovskoi konferentsii po prikladnoi teorii ustoichivosti dvizheniia i analiticheskoi mekhanike. Kazan', Kazanskii aviatsionnyi in-t, 1964. 144 p. (MIRA 18:12)

1. Mezhvuzovskaya nauchnaya konferentsiya po analiticheskoy mekhanike i ustoychivosti dvizheniya, Kazan, 1962.

SEDOV, L.I., otv. red.; SOKOLOVSKIY, V.V., red.; DZHANELIDZE, G.Yu., red.; KALININ, S.V., red.; LOYTSYANSKIY, L.G., red.; LUR'YE, A.I., red.; MIKHAYLOV, V.V., red.; PETROV, G.I., red.; RUMYANTSEV, V.V., red.; SHAPIRO, G.S., red.; CHAKHIREV, A.G., red. izd-va; ZAMARAYEVA, R.A., tekhn. red.

[Proceedingsof the All-Union Congress on theoretical and Applied Mechanics, January 27- February 3, 1960] Trudy Vsesoyuznogo s"ezda po teoreticheskoi i prikladnoi mekhanike. 1st, Moscow, 1960; obzornye doklady. Moskva, Izd-vo Akad. nauk SSSR, 1962. 467 p. (MIRA 15:9)

1. Vsesoyuznyy s"ezd po teoreticheskoy i prikladnoy mekhanike. 1st, Moscow, 1960.
(Mechanics—Congresses)

L 65 66-65 EWG(k)-2/EWA(c)/EWT(l)/EWT(m)/EPA/EWP(h)/FSS-2 IJP(c)

ACCESSION NR: AR5019346 UR/0124/65/000/001/A010/A010
531.36+531.391.3

SOURCE: Ref. zh. Mekhanika, Abs. 7A51

AUTHOR: Kalinin, S. V.

TITLE: Use of the Lyapunov-Chetayev approach in studying problems of the flight stability of autopilot-equipped aircraft under critical conditions

CITED SOURCE: Tr. Mezhvuz. konferentsii po prikl. teorii ustoychivosti dvizheniya i analit. mekhan., 1962. Kazan', 1964, 86-90

TOPIC TAGS: aircraft flight stability, autopilot, critical flight condition, aircraft autopilot

TRANSLATION: The report considers stability conditions for an autopilot-equipped aircraft on the assumption that servomotor characteristics inforporate periodic functions of time which reflect periodic pulsations. The Lyapunov function is written for various critical conditions (one zero root, two purely imaginary roots, and one zero and two purely imaginary roots), then a second approximation equation is used to study the stability conditions. Bibl. with 3 titles. M. Z. Kolovskiy.

SUB CODE: AC ENCL: 00

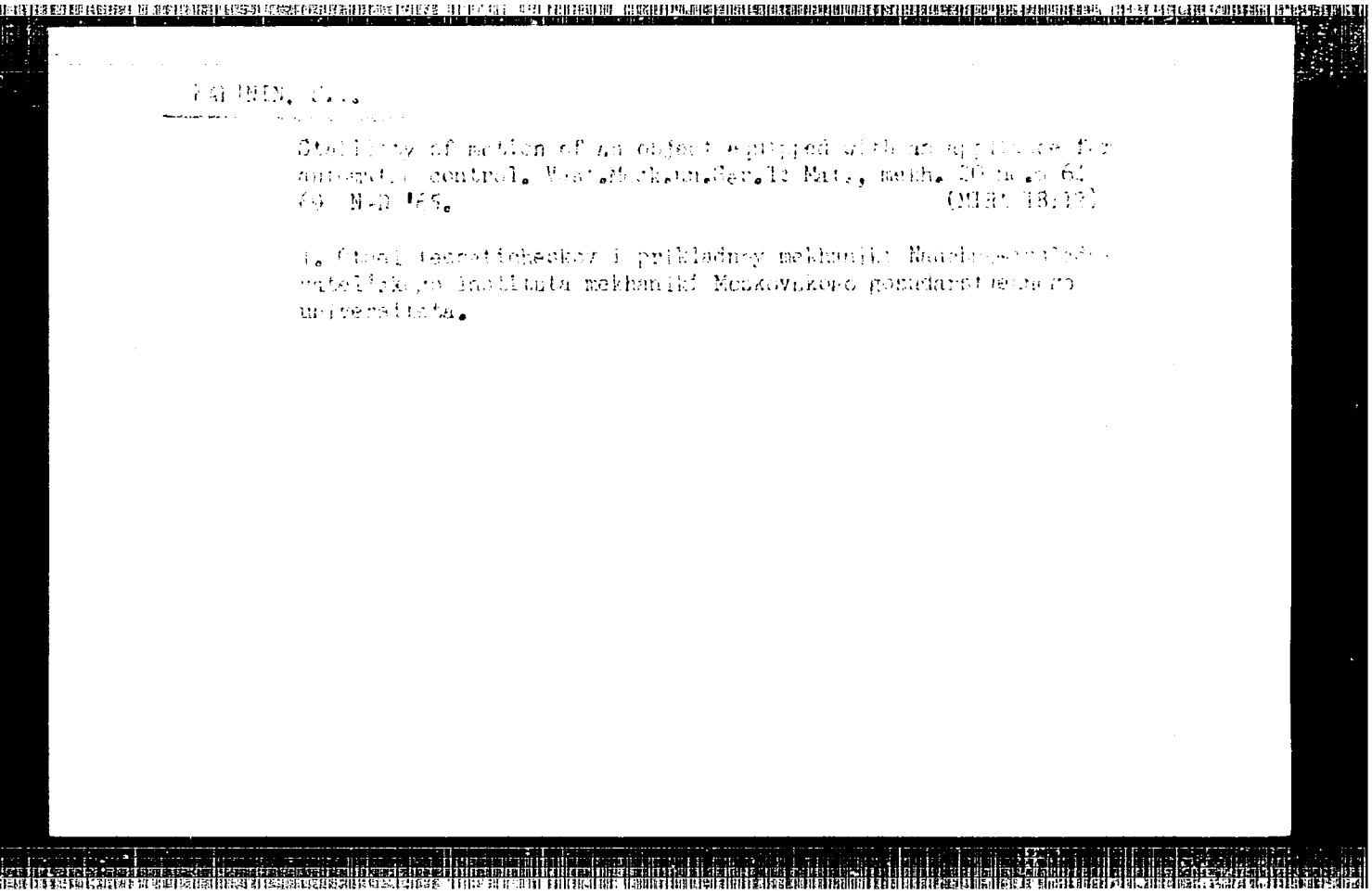
Card 1/1

KALININ, S.V.; MIKHAYLOV, G.K.

Second All-Union Conference on Present-day Problems in Mechanics. Vest. AN SSSR 34 no.5:142-144 My '64. (MIRA 17:6)

KALININ, S.V.

Second All-Union Conference on Theoretical and Applied Mechanics.
Vest. Mosk. un. Ser. 1:Mat., mekh. 19 no.3:90-91 My-Je '64.
(MIRA 17:6)



L 31531-66 EWT(d)/EWP(v)/EWP(k)/EWT(h)/EWP(l) BC
ACC NR: AP6010645 SOURCE CODE: UR/0055/65/000/006/0064/0069

AUTHOR: Kalinin, S. V.

ORG: Department of Theoretical and Applied Mechanics, NII of Mechanics, MGU (Otdel teoreticheskoy i prikladnoy mekhaniki NII mekhaniki MGU)

TITLE: The motion stability of a controlled plant fitted with an automatic control device

SOURCE: Moscow. Universitet. Vestnik. Seriya I. Matematika, mekhanika, no. 6, 1965, 64-69

TOPIC TAGS: automatic control theory, automatic control equipment, motion stability, nonlinear differential equation

ABSTRACT: An investigation of the motion stability of a controlled plant equipped with an automatic control device is of great practical importance. Linear problems have been subjected to the most intensive studies in this field. However, the motion of plants with high velocities and the development of a high-accuracy device for automatic control and regulation require a full investigation of nonlinear equations which describe the motion under study. The present author applies the classical methods of Lyapunov-Chetayev (A. M. Lyapunov. Obshchaya zadacha ob ustoychivosti dvizheniy. M., ONTI, 1935; N. G.

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L 31931-66

ACC NR: AP6010645

Chetayev. Ustoychivost'dvizheniya. M., GITTL, 1955) to an investigation of the motion stability described by nonlinear differential equations. The article studies the case when the characteristic equation of linear approximation has one zero root, and the case when it has a zero and a pair of pure imaginary roots. The latter case is reduced to the case of two zero roots with two groups of solutions. Orig. art. has: 12 formulas.

SUB CODE: 13,12 / SUBM DATE: 09Jan65 / ORIG REF: 008

Card 2/2 LC

ACC NR: AP6030730 SOURCE CODE: UR/0055/66/000/004/0117/0128

AUTHOR: Kalinin, S. V.; Zhukovskiy, V. I.

ORG: Department of Theoretical and Applied Mechanics NIIM (Otdel teoreticheskoy i prikladnoy mekhaniki NIIM)

TITLE: Conditional stability of motion of an object with an automatic control device in some critical cases

SOURCE: Moscow. Universitet. Vestnik. Seriya fiziki i khimii, no. 4, 1966, 117-128

TOPIC TAGS: servomotor, motion stability, aircraft stability

ABSTRACT: The system of equations for the motion of an object (aircraft) with an automatic control is given by

$$\begin{aligned} &\ddot{\varphi} + M\dot{\varphi} + k^2\varphi = -N\eta, \\ &\ddot{\eta} + p\eta = F(t, \Psi), \qquad (1) \\ &\Psi = \varphi + \beta\dot{\varphi} - \frac{1}{a}\eta. \end{aligned}$$

The first equation is that of the object the motion of which is to be regulated; the second is the equation of the servomotor. Here φ is the deviation from the state

Card 1/2 UDC: 531.391.5

ACC NR: AP6030730

prescribed for the system, η - angle of the rudder rotation. ψ is the argument of the rudder regulation, $F(t, \psi)$ is the characteristics of the servomotor which determines the rate of readjustment of steering. The authors consider the case when $F(t, \psi)$ is not linear. A linear approximation results in a characteristic equation, of which the following cases are considered: 1) one zero root, 2) one zero and two imaginary roots, 3) two zero roots, 4) three zero roots. A case of a small mass of the servomechanism is also considered. The general conclusion is that in order to have a stable motion, the nonlinear characteristics of the servomotor can be given not only by an equation of an odd order, but also, under certain conditions, by an equation of an even order. Orig. art. has: 23 equations.

SUB CODE: 13/ SUBM DATE: 11May65/ ORIG REF: 014

Card 2/2

KALININ, T.

Review of the forms of primary accounting. Bukhg. uchet 15 no.2:5-11 F '58. (MIRA 11:3)

(Accounting)

ZHEBRAK, M.Kh., redaktor; KALININ, T.V., redaktor; MATVEYEVA, Ye.N., tekhnicheskiy redaktor; POPOVA, S.M., tekhnicheskiy redaktor

[Calculating output and wages in a machine building plant] Uchet vyrabotki i zarabotnoi platy na mashinostroitel'nom zavode. Pod red. M.Kh.Zhebraka i T.V.Kalinina. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroitel'noi lit-ry 1955. 190 p. (MLRA 8:7)

1. Dom inzhenera i tekhnika imeni F.E.Dzerzhinskogo, Moscow. (Machinery industry--Accounting)

KALININ

KALININ,V., inzhener

Stamping kitchen utensils from aluminum alloys. Prom.koop. no.4: 49-51 Ap '55. (MLRA 8:11)
(Kitchen utensils) (Sheet-metal work)

KALININ, V.; LOBZA, V.

Fuel economy by means of cutting off engine cylinders. Avt.transp. 32 no.4:12-13 Ap '54. (MLRA 7:6)
(Gas and oil engines)

KALININ, V., inzh.

New universal electric locomotive made in the Czechoslovak Republic. Zhel.dor.transp. 36 no.3:88-89 Mr '55. (MIRA 12:5)

(Czechoslovakia--Electric locomotives)

MINAYEV, N., master; KALININ, V., naladchik; POPOV, V., naladchik

From goal to goal. Sov. profsoiuzy 16 no.22:7-10 N '60.
(MIRA 14:1)

1. Rukovoditel' brigady kommunisticheskogo truda avtomaticheskoy linii zavoda "Krasnyy proletariy" (for Minayev). 2. Chleny brigady kommunisticheskogo truda avtomaticheskoy linii zavoda "Krasnyy proletariy" (for Kalinin, Popov).
(Moscow—Machine-tool industry)
(Socialist competition)

KALININ, V.

MUKZ-35 feed mill in standard granaries. Muk.-elev.prom.26 no.5:26-27 My '60. (MIRA 14:3)

1. Nachal'nik otdela ekspluatatsii tekhnicheskoy bazy i kapital'nogo stroitel'stva Udmurtskogo upravleniya khleboproduktov.
(Feed mills)

GIGA, V., general-mayor; KALININ, V., podpolkovnik

Search for new methodological forms. Voen. vest. 42 no.8:77-79 Ag '62. (MIRA 15:7)

(Military education)

MERKULOV, N. (g.Gor'kiy); RYS', A.; VYAL'YATAGA, Yu. [Valjataga, J.] (Tallin); FROLOV, V.; SAFONOV, V.; KOLESNIK, V.; KALININ, V.; ROGOV, A. (g.Gorodets Gor'kovskoy obl.); VOINOV, B. (g.Salekhard)

From the editors' mail. Sots.trud 7 no.7:141-144 Jl '62. (MIRA 15:8)

1. Glavnyy inzh. normativno-issledovatel'skoy laboratorii Glavnogo upravleniya mestnoy promyshlennosti pri Sovete Ministrov Belorusskoy SSR (for Rys'). 2. Yuriskonsul't yuridicheskoy konsul'tatsii Ivanovskogo oblastnogo soveta professional'nykh soyuzov (for Frolov). 3. Zamestitel' nachal'nika otdela truda zavoda "Krasnoye Sormovo" (for Safonov). 4. Nachal'nik otdela truda Gosudarstvennogo tresta po vyrashchivaniyu sakharnoy svekly Krasnodarskogo sovnarkhoza (for Kolesnik). 5. Nachal'nik otdela truda i zarabotnoy platy tresta "Astrakhanpromstroy" (for Kalinin).

(Steel industry--Quality control)
(Production standards--Research)
(Wages)

NIKOLAYEV, V.; KROSHNEV, A. (Temir-Tau); VLODOV, P., inzh. (Ostrogozhsk, Voronezhskoy obl.); BOGDANOV, A. (Arkhangel'skaya obl.); ZHEMOCHKIN, G.; RENKOV, V. (Riga); KALININ, V. (Riga); GVASALIYA, Sh.; DIDIK, A. (Lakhdenpokh'ya, Karel'skoy ASSR); SINEL'NIKOV, A.

Advice of specialists. Za rul. 20 no.12:20-21 D '62. (MIRA 15:12)
(Motor vehicles)

PROTOCHANSKIY, M., podpolkovnik; BRAILOVSKIY, G., podpolkovnik;
KALININ, V., podpolkovnik

Methodical habits of students on tactics. Voen. vest. 43
no.2:62-64 F '64. (MIRA 17:1)

KALININ, V.

Make adjustments in calvulating the operating capacity of grain dryers.
Muk. -elev.prom.22 no.11:30 N '56. (MIRA 10:1)

1. Udmurtskaya kontora Zagotzerno.
(Grain--Drying)

KALININ, V.

KALININ, V.

The repair of equipment coordinated with the reconstruction of grain driers. Muk.-elev.prom. 23 no.5:12-13 My '57. (MLRA 10:9)

1. Udmurtskaya kontora Rosglavzerno.
(Grain--Drying) (Grain handling machinery--Repairing)

TEREKHOV, A.; KALININ, V.; FILIPPOVICH, B.; P'YANENKO, V., inzhener.

Problems pertaining to the organization of grain cleaning.
Muk.-elev.prom.23 no.8:7-10 Ag '57. (MIRA 10:11)

1. Belotserkovskiy sel'skokhozyaystvennyy institut (for Terekhov).
2. Udmurtskoye respublikanskoye upravleniye khleboproduktov (for Kalinin). 3. Vileyskiy khlebopriyemnyy punkt Molodechnenskoy oblasti (for Filippovich). 4. Moskovskaya normativno-issledovatel'skaya stantsiya (for P'yanenko).
(Grain--Cleaning)

KALININ, V.

We were all ready for grain deliveries. Muk.-elev. prom. 24 no.9:29 S '58. (MIRA 11:10)

1. Elevatorno-skladskoy otdel Udmurtskogo upravleniya khleboproduktov.
(Udmurt A.S.S.R.--Grain trade)

KALININ, V.

Applying paraffin to corn seeds. Muk.-elev. prom. 28 no.7:9-10 Jl '62. (MIRA 15:9)

1. Udmurtskoye respublikanskoye upravleniye khleboproduktov.
(Udmurt A. S. S. R.—Corn (Maize))
(Paraffins)

KALININ, V.

Meetings in Yugoslavia. Sov. profsoiuzy 19 no.7:26-27 Ap '63.
(MIRA 16:4)

(Yugoslavia—Industries) (Yugoslavia—Trade unions)

L 63209-65 EWT(m)/EWA(h)

ACCESSION NR: AP5018015 UR/0018/65/000/007/0024/0029

AUTHORS: Zolotarev, P. (Colonel); Kalinin, V. (Lieutenant colonel) 13

TITLE: In search of the new 15

SOURCE: Voyennyy vestnik, no. 7, 1965, 24-29

TOPIC TAGS: decontamination, degassing, decontamination equipment, decontamination method, radioactivity measurement, training/ ARS 12 special treatment machine, ADM 4t special treatment machine

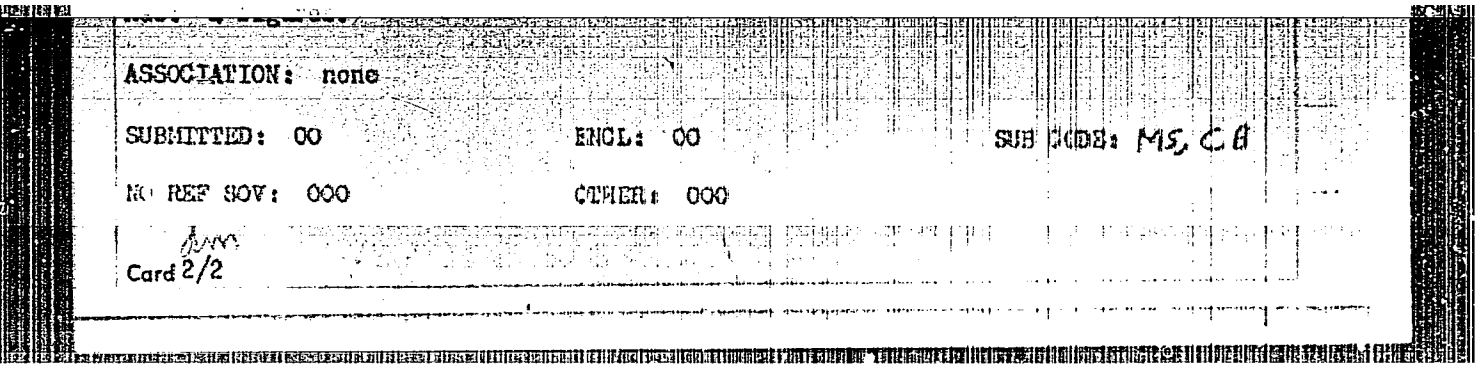
ABSTRACT: At the start of the training year the Special Treatment company was poorly prepared and had a low combat effectiveness. In a discussion encouraged by the Communist League and members of the Young Communists' League [illegible]

Card 1/2

L 63209-65

ACCESSION NR: AP5018015

followed by a gas attack. The tank battalion was so deployed as to allow the Special Treatment units to carry out the cleansing processes while maintaining maximum defensive capabilities. As each section was cleansed, it became able to


ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MS, CB

NO REF SOV: 000 OTHER: 000

Card 2/2

KALININ, V.A.

Standardization courses at the West-Siberian Economic Council.
Standartizatsiia 28 no.2:51 F '64. (MIRA 17:3)

Kalinin V.A.

AUTHOR: Kalinin, V. A. 56-1-35/56

TITLE: The Equation of State of Solid Argon
(Uravneniye sostoyaniya tverdogo argona)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 1, pp. 229-23o (USSR)

ABSTRACT: The dependence of the energy of the molecular crystal is here selected in the form $E = A \exp(-Bx^{1/2})-Cx^{-2}$, where A,B,C signify constants experimentally to be determined. $x=\varrho_0/\varrho$ signifies the reduced volume and ϱ_0 - the density at the absolute zero point. The higher accuracy of the above-used expression as compared to expressions suggested earlier (references 1,2) is pointed out. The free energy of the unit of mass according to Debye (Debaye)'s theory of the crystalline state has the form $F = A \exp(-Bx^{1/3})-Cx^{-2} + (9/8)Nk\Theta + NkT\left[3\ln(1 - e^{-\Theta/T})-D(\Theta/T)\right]$. In this connection N signifies the number of atoms in the unit of mass, k - Boltzmann's constant, Θ - the Debye (Debaye) characteristic temperature being dependent on the volume, T - the absolute temperature, $D(\Theta/T)$ - the Debye (Debaye) function. The third term of the last-given formula

Card 1/3

The Equation of State of Solid Argon

corresponds to the energy of the zero oscillations of the atoms of the lattice and in the case of argon amounts to ~10% of the total energy of the crystal. By the last-given formula the author determines the pressure P, the isothermal compressibility $\varkappa_T$ and the coefficient of thermal expansion α. For the determination of the parameters A,B,C 2 points of the experimental curve P(x) at T = 65°K and still other values were used. In this manner the values A = 8,000; B = 13,078; C = 3,877 kal/mol were obtained by successive approximation. The functions $\varphi(T)$,$\alpha(T)$ and P(v) calculated with these values of the parameters are for 65°K in good agreement with the experimental data. The calculated and experimental values of the adiabatic compressibility also are in good agreement. The potential written down at the beginning of the paper at the values of the parameters found here describes well the existing experimental data for solid argon and can also be used for the extrapolation of the equation of state to higher pressures. There are 1 figure, 1 table, and 6 references, 1 of which is Slavic.

ASSOCIATION: Institute for Physics of the Earth AN USSR
(Institut fiziki Zemli Akademii nauk SSSR)

Card 2/3

AUTHORS: Magnitskiy, V. A. and Kalinin, V. A. SOV/49-59-1-10/23

TITLE: Properties of the Earth's Crust and the Physical Nature of the Transition Layer (Svoystva obolochki zemli i fizicheskaya priroda perekhodnogo sloya)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1959, Nr 1, pp 87-95 (USSR)

ABSTRACT: The Earth's crust is divided into three layers: an upper layer B, a transition layer C and a lower layer D. The whole crust is assumed to be in the solid state. Studies of the rate of change of the bulk modulus K with pressure p showed that the B- and D-layers may be regarded as uniform in structure. The exact nature of the transition layer C is not known, although it is of great importance in the theory of formation of the Earth's crust. It is known that the velocity of seismic waves rises rapidly with depth in the region of the transition layer C, i.e. between 400 and 900 km. Fig.1 shows the velocity of longitudinal waves at depths from 100 to 1400 km obtained by Jeffreys (Ref 12) and the velocity obtained by a different method by Gutenberg (Ref 13) down to depths of 600 km (dashed curve). This

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figure shows clearly the rapid rise of the seismic wave velocities in the transition layer near 500 km. This change of velocity is due to a rapid change in the elastic coefficients such as K (bulk modulus) in the transition layer C. Fig.2 gives the ratio K/ρ, where ρ is the density as a function of depth. The authors suggest that it is possible to explain the properties of the C-layer by a transition from the predominantly ionic structure in the B-layer to predominantly covalent bonds in the D-layer. No assumptions are made about the chemical properties of the Earth's crust. This hypothesis has already been discussed by one of the authors (Ref 21). It is based on the following ideas. Ionic and covalent crystals predominate in the Earth's crust. Transition from the ionic to the covalent state is in principle possible by change of pressure and temperature, as shown by Pauling (Ref 22). There are practically no experimental data on ionic-covalent transitions because of great difficulties in distinguishing between the usual polymorphic transitions at high

Properties of the Earth's Crust and the Physical Nature of the Transition Layer

temperatures and pressures and transition from one bond type to another. The authors examine in detail the existing geophysical and physical-chemical data on the Earth's crust and show that these data are in qualitative agreement with the authors' hypothesis on the nature of the C-layer. This hypothesis makes it possible to explain the increase in hardness on transition from the B to the D-layer since covalent crystals are generally harder. Increase of electrical conductivity observed in the C-layer may be due to deformation of the energy spectrum of electrons and to a transition from ionic to semiconducting electron conduction. Acknowledgments are made to B.I.Davydov and V. N. Zharkov for their advice.
There are 6 figures and 33 references, 11 of which are Soviet, 17 English, 1 Italian, 1 Japanese, 1 Dutch, 1 Swiss and one a translation from English into Russian.

Card 3/4 3

Inst. Earth Physics, AS USSR

PHASE I BOOK EXPLOITATION SOV/4490

Akademiya nauk SSSR. Institut fiziki Zemli

Voprosy teoreticheskoy seysmologii i fiziki zemnykh nedr (Problems in the Theory of Seismology and Physics of the Earth's Interior) Moscow, 1960. 172 p. (Series: Its: Trudy, no. 11 (178)) Errata slip inserted. 1,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut fiziki Zemli imeni O. Yu. Shmidta

Resp. Ed.: V.A. Magnitskiy, Doctor of Technical Sciences; Ed. of Publishing House: V.A. Kalinin; Tech. Ed.: S.G. Tikhomirova.

PURPOSE: This collection of articles is intended for astrophysicists, geophysicists, and seismologists.

COVERAGE: This issue of the Transactions of the Institute of Physics of the Earth imeni O. Yu. Shmidt contains articles on theoretical problems in seismology and on recent investigations in the field of earthquake mechanics. Four out of fourteen

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Problems in the Theory of Seismology (Cont.) SOV/4490

articles in the collection have been abstracted. References accompany individual articles.

TABLE OF CONTENTS:

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conclude that if the moon is solid, the hydromagnetic intensification mechanism is not possible, and if there is a liquid silica interior, one should expect a magnetic field related to the moon of the order of 1 to 0.1 gauss. The authors thank B.I. Davydov and V.A. Magnitskiy.

Kalinin, V.A. Equation of State of Certain Metals Under High Pressures

Lyubimova, Ye. A. Heat Transport by Excitons in the Earth's Mantle

Magnitskiy, V.A. Problem of Interpretation of Principal Irregularities of the Gravitational Field of the Earth

The author discusses the basic deviations of the earth's gravitational field from the normal values, and reports on the calculation of the densities of the equivalent layer made by the well-known Helmert formula in order to evaluate the magnitude of the disturbing masses. It is pointed out that similar calculations made by E. Niskanen and L. Tanni in 1951 [ref. given] are not entirely acceptable since they are based on geoid altitudes obtained by L. Tanni in 1948 [ref. given].

Problems in the Theory of Seismology (Cont.) SOV/4490

The present article gives values of equivalent layer density obtained for every ten-degree sector from data by I.D. Zhongolovich. The results are shown graphically. The error in the calculation of equivalent layer density is 10% of the maximum value. The errors in geoid elevations are much smaller. Several theories as to the nonuniform mass distribution in the mantle are advanced. The author concludes that uneven distribution of radioactive elements in the earth, causing temperature variations in the solid mantle, nonuniform mass distribution, and other factors can be the cause of extensive perturbations in the gravitational field.

Kobbtsyn, V.P. Transition of Solid Helium to the Metallic Phase Under High Pressures 85

Kvark, B.M. Some Functional Methods in the Ideal Linear Theory of Plasticity 93

Riz-Borok, V.I., and G.I. Pavlova. Generalization of Data on the Mechanism of Earthquakes 121

A method for reducing the characteristics of observations to some generalized parameters of the mechanics of earthquakes is discussed. Analysis was made of systems of observations for the Garmskaya oblast', Northern Tyan'-Shan', the Caucasus, and for the region situated [illegible]

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northwest of the Bol'shoy Balkhan mountain range (Turkmeniya). The authors conclude that the method described is cumbersome, but that it is justified by the resulting simplification of nodal line plotting for which there have been no formal rules. The results of this study, based on observations of the Tadzhikskaya Kompleksnaya Seysmologicheskaya ekspeditsiya (Tadzhik Combined Seismological Expedition) network of stations, and on data from the literature, indicate that without preliminary analysis of a system of observations there is no reason for overall study in a new region of the mechanics of earthquakes, or the mass processing of any system of observations for any purpose whatsoever. The principle at the base of the proposed method for studying the prevalent strikes and dips, shifts of discontinuities, etc., can be applied in the solution of a number of other problems. No personalities are mentioned.

Pavlova, G.I. Problem of Changes in the Field of Stresses Due to an Earthquake 148

The author discusses the tangential stresses in a finite field. This is of interest for studying certain problems in seismology, in particular, the relationship between separate earthquakes. Following an extended mathematical treatment of a model of a stressed oblate ellipsoid, and after presenting the results of computations in a number of diagrams, the author concludes that as a result of an earthquake the tangential stresses decrease, and in general the density of elastic energy decreases in the approximately spherical spread, the radius of which is of the same order as the radius of the plane of dislocation. When this plane is continued to the vicinity of the focal area, the tangential stresses increase with greater oblateness of the hypocenter, though there is concentration of stresses for any given hypocenter oblateness. Finally, in the direction of displacement, the zone of concentrated stresses is separated from the focal area by a rarifaction zone which is greater, the less the oblateness of the focal area. The concentration of stresses is maximum at the point perpendicular to this direction at the edge of the plane of dislocation. No personalities are mentioned.

Problems in the Theory of Seismology (Cont.) SOV/[illegible]

Bessonova, E.N., Propagation of Longitudinal and Transverse Plane Waves in an Infinite Viscous-Elastic Maxwell Medium

AVAILABLE: Library of Congress

Card 7/7

[illegible]/dmm
12-1-60

S/049/60/000/02/018/022
E131/E459

AUTHOR: Kalinin, V.A.

TITLE: Deformation of a Full Shell Containing Atoms and Ions Subjected to a High Uniform Pressure

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya, 1960, Nr 2, pp 333-336 (USSR)

ABSTRACT: Very accurate formulae determining the physical properties of hard bodies can be obtained from the exponential relationship of repulsion forces affecting neighbouring atoms and ions. The method of calculation of these forces for He, Li^{+}, Be^{++} is described. In the case of two atoms of He, the Hamiltonian of the system is defined as Eq (1), where r_{ai} and r_{bi} - the distances of i-th electrons from the centres a and b, r_{ij} - distance between electrons, Z - charge, Δ_i - Laplacian for the coordinates of the i-th electron. The waving function of the above formula can be represented as Eq (2). The energy of the system E can be determined from Eq (4), where C = 0.577216 is the Euler constant. The solution of the above equation is shown in Fig 1, while Fig 2 shows the relationship

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S/049/60/000/02/018/022
E131/E459

Deformation of a Full Shell Containing Atoms and Ions Subjected to a High Uniform Pressure

between lg E and the constant R (R = 1.5). The range of pressures affecting the shell can be obtained from

$$p = -\frac{\partial E}{\partial V}$$

where V is the volume. There are 2 figures, 1 table and 8 references, 4 of which are Soviet and 4 English.

ASSOCIATION: Akademiya nauk SSSR Institut fiziki Zemli (Academy of Sciences USSR, Institute of Physics of the Earth)

SUBMITTED: June 30, 1959

Card 2/2

S/109/60/005/009/023/026
E140/E455

AUTHORS: Davidchevskiy, Yu.I., Minkovich, B.M. and Kalinin, V.A.

TITLE: Antennas with Quasi-Optimal Apertures

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol.5, No.9, pp.1545-1546

TEXT: It is shown that the current distribution of an optimal linear antenna is equivalent to variations of effective height. The results are in agreement with those of Shanks and Bickmore (Ref.6). There are 1 figure and 6 references: 4 Soviet and 2 English.

SUBMITTED: January 7, 1960

Card 1/1

89019

S/020/60/135/004/012/037
B019/B077

16.7500 (2108)

AUTHOR: Zharkov, V. N., and Kalinin, V. A.

TITLE: The Equation of State of Iron at Pressures of up to Several Million Atmospheres

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 4, pp. 811 - 814

TEXT: A new method for determining the equation of state for metals has been developed by using the experimental Hugoniot adiabatic curve. This method is especially applied to the equation of state of iron. The Hugoniot adiabatic curve of iron is drawn by using experimental data of L. V. Al'tshuler et al. (Ref. 3) and shown in Fig. 1. A pressure of about $1.31 \cdot 10^5$ atm is pointed out where a polymorphous transition exists and where a shock wave becomes instable and is divided into two waves. Above $3.5 \cdot 10^5$ atm there are again stable shock waves. The contribution of thermally excited conduction electrons to pressure and energy is negligibly small

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89019

The Equation of State of Iron at Pressures of up to Several Million Atmospheres

S/020/60/135/004/012/037
B019/B077

at low temperatures. Pressure and energy can be represented as sums of potential and thermal parts. The following equation are given for energy and pressure:

$$E = \underset{-}{\Phi}(x) + \frac{9}{8}\frac{R\Theta}{\mu} + \frac{3RT}{\mu}D(\Theta/T), \quad \underset{-}{\Phi}(x) = \frac{3}{\rho_0}(b^{-1}\Sigma - k_2 x^{-1/3}) \qquad (2)$$

$$P = P_0(x) + \frac{\rho_0\gamma}{x}\left\{\frac{9}{8}\frac{R\Theta}{\mu} + \frac{3RT}{\mu}D(\Theta/T)\right\}, \quad P_0(x) = \Sigma x^{-2/3} - k_2 x^{-4/3} \qquad (3)$$

with $\Sigma \equiv k_1 e^{-bx^{1/3}} \equiv Ae^{b(1-x^{1/3})}$, $D(z) = \frac{3}{z^3}\int_0^z \frac{y^3 dy}{e^y - 1}$; k_1, k_2, and b

are found experimentally. The determination of A, b, and k_2 from experimental data for phases with high pressures is discussed in detail. For high pressure and high temperature, the portion of thermally excited conduction electrons cannot be neglected, and the following expression

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The Equation of State of Iron at Pressures of up to Several Million Atmospheres

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is obtained for the Hugoniot adiabatic curve

$$p_H = \frac{n_2 - \sqrt{n_2^2 - 4n_1 n_3}}{2n_1} \qquad (11).$$

The temperature in the shock adiabatic curve (11) is determined from the expression:

$$T = \left[E_H - \bar{\varphi}(x) - (x/\gamma_0 g)\,(p_H - p_0(x))\right] \left\{(3R/\mu)\,(1-\gamma/g)\right\}^{-1} \qquad (12)$$

The results of this calculation are represented graphically in Fig. 1. There are 1 figure, 1 table, and 9 references: 6 Soviet and 3 US.

ASSOCIATION: Institut fiziki Zemli im. O. Yu. Shmidta Akademii nauk SSSR (Institute of Physics of the Earth imeni O. Yu. Shmidt, Academy of Scionces USSR)

Card 3/5

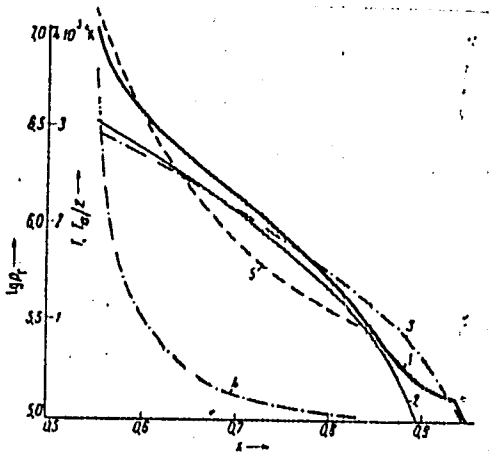
89019

The Equation of State of Iron at Pressures of up to Several Million Atmospheres

S/020/60/135/004/012/037
B019/B077

PRESENTED: June 17, 1960, by Ya. B. Zel'dovich, Academician

SUBMITTED: June 12, 1960



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$$n_1 = \frac{1}{\rho_0^2}\left[\frac{x}{g} - \frac{1}{2}(1-x)\right]^2;$$

$$n_2 = \frac{1}{\rho_0}\left\{\frac{2\gamma(3R/\mu)^2(1-\gamma/g)}{\delta x^{1/3} ag}\left[\frac{x}{\gamma} - \frac{1}{2}(1-x)\right] + 2\left[\frac{x}{g} - \frac{1}{2}(1-x)\right]\left[\frac{x}{\rho_0 g}p_0(x) + E_0 - \Phi(x)\right]\right\};$$

$$n_3 = \left\{\frac{2\gamma(3R/\mu)^2(1-\gamma/g)}{\delta x^{1/3} ag}\left[\frac{x}{\rho_0\gamma}p_0(x) + E_0 - \Phi(x)\right] + \left[\frac{x}{\rho_0 g}p_0(x) + E_0 - \Phi(x)\right]^2\right\}.$$

Legend to Fig. 1: 1) Hugoniot adiabatic curve; 2) iron zero isothermal line after phase transition; 3) iron zero isothermal line before phase transition; 4) temperature in the shock adiabatic curve; 5) degenerate temperature.

Card 5/5

ZHARKOV, V.N.; KALININ, V.A.

Equation of state for gabbro and dunite at high pressures.
Izv. AN SSSR. Ser. geofiz. no.3:298-306 Mr '62. (MIRA 15:2)

1. AN SSSR, Institut fiziki Zemli.
(Equation of state)
(Gabbro) (Dunite)

ZHARKOV, V.N.; KALININ, V.A.

Reflection of seismic waves at the earth's shell-core boundary. Izv. AN SSSR. Ser. geofiz. no.4:449-455 Ap '62. (MIRA 15:4)

1. Institut fiziki Zemli AN SSSR.

(Seismic waves)

ZHARKOV, V.N.; KALININ, V.A.

Grüneisen's constant for NaCl at high pressures. Dokl.AN SSSR 145 no.3:551-554 Jl '62. (MIRA 15:7)

1. Institut fiziki Zemli imeni O.Yu.Shmidta AN SSSR. Predstavleno akademikom M.A.Leontovichem.
(Shock (Mechanics)) (Salt)

YEGOROV, N.N.; KALININ, V.A.; TRUBITSYN, V.P.

Absorption of Rayleigh waves in a layer on half-space. Trudy Inst. fiz. Zem. no.20:57-66 '62. (MIRA 15:8)
(Seismology)

KALININ, V.A.; TRUBITSYN, V.P.

Attenuation of surface waves in low-loss media. Izv.AN SSSR. Ser.geofiz. no.12:1786-1794 '62. (MIRA 16:2)

1. Institut fiziki Zemli AN SSSR.
(Seismic waves)

L 08718-67 EWT(d)/EWP(e)/EWP(v)/EWP(k)/EWP(l) IJP(c)
ACC NR: AP6032505 SOURCE CODE: UR/0413/66/000/017/0072/0072

AUTHOR: Averbukh, I. I.; Kalinin, V. A.; Pranitskiy, A. A.; Stukel'man, L. L. 27 B

ORG: none

TITLE: Ultrasonic resonance method of thickness inspection. Class 42, No. 185496 [announced by the All-Union Scientific Research Institute for the Development of Methods of Nondestructive Quality Control (Vsesoyuznyy nauchno-issledovatel'skiy institut po razrabotke nerazrushayushchikh metodov kontrolya materialov)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 17, 1966, 72

TOPIC TAGS: thickness inspection, ultrasonic resonance , ultrasonic inspection

ABSTRACT: This Author Certificate introduces an ultrasonic resonance method of thickness inspection. To obtain the deviation of the measured thickness from the nominal thickness, the ultrasonic generator's frequency is varied within the range determined by the thickness limits, thereby ensuring the occurrence of resonance only at a frequency corresponding to a given thickness.

SUB CODE: 11, 13/ SUBM DATE: 31Mar65/

Card 1/1 nst UDC: 531.717.11

BATYUSHKOVA, Irina Vasil'yevna; GORSHKOV, G.P., prof., red.; KALININ, V.A., red.izd-va; GUSEVA, I.N., tekhn.red.

[Concepts of the causes of earthquakes in works of Russian scientists] Predstavleniia o prichinakh zemletriasenii v rabotakh otechestvennykh uchenykh. Moskva, Izd-va Akad. nauk SSSR, 1959. 77 p. (MIRA 12:8)
(Seismology)

S/019/61/000/023/052/082
A154/A126

AUTHORS: Kalinin, V. A., Genin, N. N., Glumov, P. D., Kaushan, A. G.

TITLE: A device for continuous ingot casting

PERIODICAL: Byulleten' izobreteniy, no. 23, 1961, 55

TEXT: Class 31c, 21, no. 143213 (725154/22 of April 3, 1961). A device for the continuous casting of ingots, for example nickel and other anodes, consisting of a feed spout, rotating roll-crystallizers and a roller table, distinguished by the fact that, in order to continuously cast ingots (anodes) in the device, the upper roll-crystallizer is made profiled with two longitudinal ribs matching the profile of the anode.

Card 1/1

KALININ, V. A.

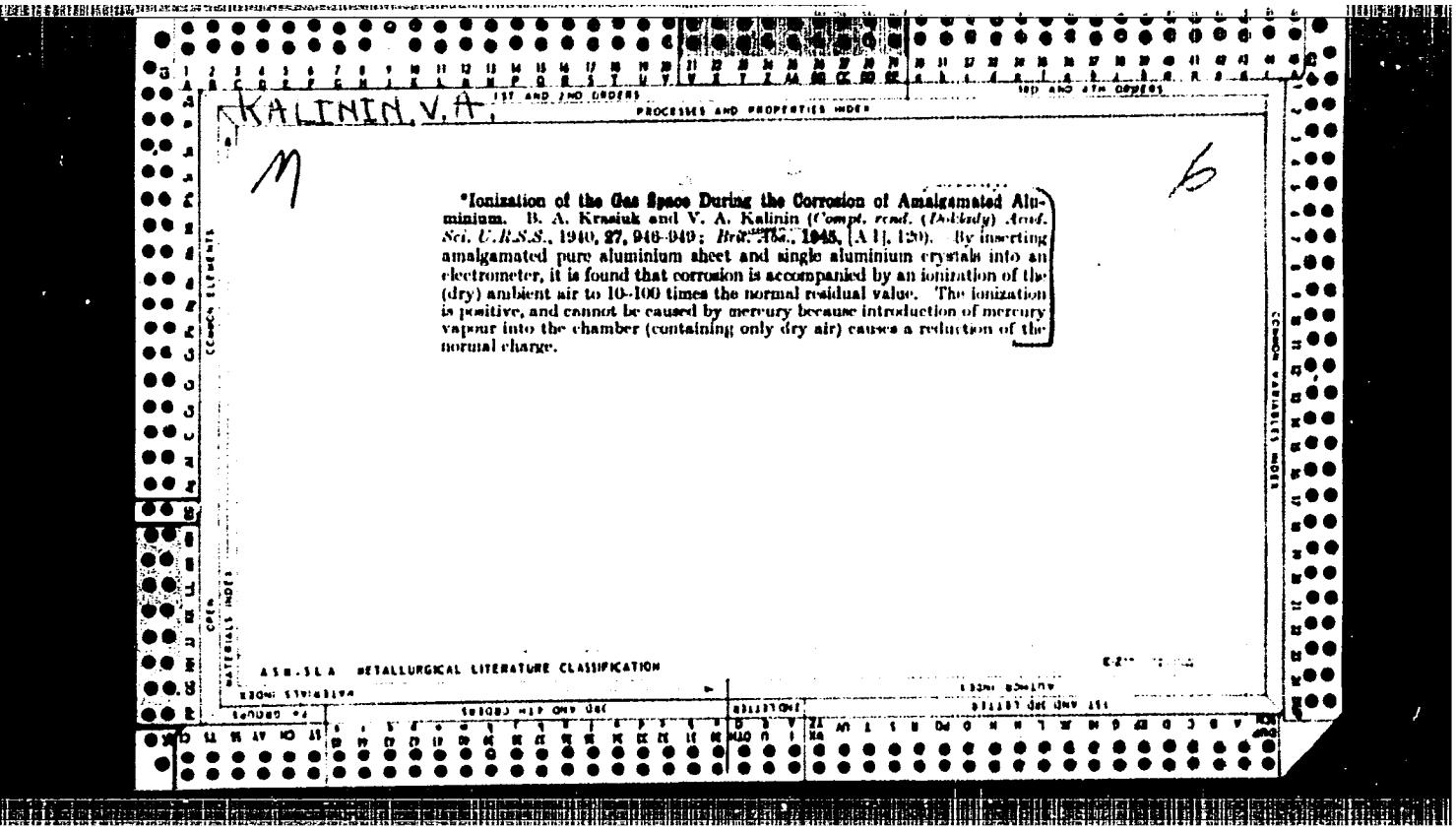
ORGANIZATSIYA PEREVOZOK LESNYKH KOROTKOMERNYKH GRUZOV V PACHKAKH, MOSKVA, IZD-VO MINISTERSTVA RECHNOGO FLOTA SSSR, 1953, 23p.

IVANOVA, A.P., doyarka; KOZUPEYEV, A.V., storozh kolkhoza; KALININ, V.A., konyukh.

The collective farm helped us. Sel'. stroi. 12 no.10:3 O '57.
(MLRA 10:11)

1. Kolkhoz imeni Radishcheva, selo Nikol'skoye, Smolenskoy oblasti, Gzhatskogo rayona.

(Housing, Rural)



KALININ, V.A.

M

B

PROCESSES AND PROPERTIES INDEX

*Ionization of the Gas Space During the Corrosion of Amalgamated Aluminium. B. A. Krasiuk and V. A. Kalinin (*Compt. rend. (Doklady) Acad. Sci. U.R.S.S.*, 1940, **27**, 946-949; *Brit. Chem.*, **1945**, [A I], 130). By inserting amalgamated pure aluminium sheet and single aluminium crystals into an electrometer, it is found that corrosion is accompanied by an ionization of the (dry) ambient air to 10-100 times the normal residual value. The ionization is positive, and cannot be caused by mercury because introduction of mercury vapour into the chamber (containing only dry air) causes a reduction of the normal charge.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KALININ, V. A.

USSR/Miscellaneous - Foundry processes

Card 1/1 : Pub. 61 - 7/23

Authors : Kalinin, V. A., and Bazlov, B. I.

Title : Mechanization of cast iron-ware casting

Periodical : Lit. proizv. 4, 17-18, July 1954

Abstract : The economical advantages derived by the mechanization of cast iron-ware casting processes (manufacture of cast iron kitchen utensils), are described. The mechanization included the introduction of a conveyer method of moulding, pouring and extrusion of casts. Drawing.

Institution : ...

Submitted : ...

KALININ, V.D.

Primary cardiac tumors. Sud.-med.ekspert. 6 no.1:50-52 Ja-Mr '63. (MIRA 16:2)

1. Respublikanskoye byuro sudebnomeditsinskoy ekspertizy (nachal'nik K.I. Skorodumov) Ministerstva zdravookhraneniya Checheno-Ingushskoy ASSR.

(HEART—TUMORS)

STRAKHOVICH, Konstantin Ivanovich, prof., doktor tekhn. nauk; SHTYM, A.N., aspirant. Prinimal uchastiye GROMOV, A.V., aspirant; KALININ, V.F., red.

[Thermal gas dynamics and the theory of heat transfer] Termogazodinamika i teoriia teploobmena. Leningrad. Pt.2. 1964. 166 p. (MIRA 18:7)

1. Leningrad. Politekhnicheskiy institut. Kafedra "Teoreticheskiye osnovy teplotekhniki." 2. Kafedra "Teoreticheskiye osnovy teplotekhniki" Leningradskogo politekhnicheskogo instituta (for Shtym, Gromov).

STRAKHOVICH, Konstantin Ivanovich, doktor tekhn. nauk, prof.; SHTYM, A.N., aspirant; KALININ, V.F., red.

[Thermal gas dynamics and heat transfer theory] Termogazodinamika i teoriia teploobmena. Leningrad, Politekhn. in-t. Pt.2. [Applied gas dynamics] Prikladnaia gazodinamika. 1964. 166 p. (MIRA 17:9)

1. Zaveduyushchiy kafedroy "Teoreticheskie osnovy teplotekhniki" Leningradskogo politekhnicheskogo instituta im. M.I.Kalinina (for Strakhovich).

KALININ, V.F.

Superimposed cards and the area of their use. NTI no.9:30-34 '64.
(MIRA 18:2)

SOV/120-59-4-19/50

AUTHORS: Kalinin, V. G., Tarasova, L. V.

TITLE: An Air-Filled Gas-Discharge Tube With a Thermal Primer

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 4, pp 90-93 (USSR)

ABSTRACT: The device described is based on the effect discovered by Broadbent and Wood (Refs 4, 5). The tube is referred to as the "thermotron". It consists of two steel rod electrodes having a diameter of 3-4 mm (see Fig 1) which are mounted inside a tube made of organic glass; the tube has a diameter of 30 mm and a height of 50 mm. The priming electrode 4 (see the figure) consists of one or two nickel or nichrome wires having a diameter of 0.1 mm and a length of 9 mm; these are welded to two nickel input terminals. The glass tube contains a number of holes in its walls in order to enable the air from the atmosphere to fill the discharge gap. The investigation of the characteristics of the tube was carried out as follows. The high-voltage capacitor C_i (see Fig 1) was connected in the anode circuit of the tube via a large resistance R_3. The resistance R in the anode circuit served to limit the current during the discharge. The priming of the tube was effected by closing the key K_2 so that the

Card 1/3

An Air-Filled Gas-Discharge Tube With a Thermal Primer

capacitance C_2 was discharged through the wires of the priming electrode. The temperature of the primer could thus be raised to 400 to 700°C and a breakdown was produced across the discharge gap. The priming network was grounded via the resistance R_1 which served to limit the current during the discharge. The tube could be operated at anode voltages from 3 to 10 kV, the discharge currents being as high as 100 kA. The voltage of the priming circuit was 100 to 250 V and the energy necessary for the priming was 0.2 to 1.2 J. The delay time between the priming and the discharge was 20 to 200 μs, and the permissible number of discharges was up to 200. The most important characteristics of the thermotron are shown in Figs 2, 3 and 4. Fig 2 shows the breakdown margin of the tube as a function of the priming energy; the breakdown margin is defined as $\theta = (U_n - U_p)/U_p$, where U_r is the

An Air-Filled Gas-Discharge Tube With a Thermal Primer

breakdown voltage of the main gap without priming and U_p is the breakdown voltage when primed. The delay time, as a function of the priming energy, is illustrated in Fig 3. The dependence of the delay time on the breakdown margin for a constant priming energy is illustrated in Fig 4. There are 4 figures, 1 table and 5 references, of which 3 are English and 2 Soviet.

SUBMITTED: May 13, 1958.

TARASOVA, L.V.; KALININ, V.G.

Electric breakdown in a high vacuum. Zhur.tekh. fiz. 34 no.4: 666-675 Ap '64. (MIRA 17:4)

ACCESSION NR: AP4028955

S/0057/64/034/004/0666/0675

AUTHOR: Tarasova, L.V.; Kalinin, V.G.

TITLE: Investigation of high vacuum electric breakdown

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.4, 1964, 666-675

TOPIC TAGS: electric breakdown, high vacuum breakdown, pulsed vacuum breakdown, vacuum breakdown mechanism

ABSTRACT: High vacuum electric breakdown was investigated under a variety of conditions. Three spark chambers were employed: one was operated at 10^{-5} mm Hg with no cold trap to remove the oil vapor; one was operated at 4×10^{-6} mm Hg with a liquid nitrogen trap; and one was brought to 3×10^{-9} mm Hg with a tantalum ion sorption pump. Four high voltage sources were used: a dc supply generating potentials up to 200 kV, a pulse generator producing up to 500 kV pulses with 8×10^{-8} sec rise time and 9×10^{-5} sec duration, a pulse generator producing approximately sinusoidal pulses up to 180 kV with 10^{-6} sec duration, and a generator producing pulses with 2×10^{-8} sec rise time and 10^{-7} sec duration. Steel, silver, copper, and tungsten electrodes were investigated; both electrodes were always of the same metal. Elec-

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ACCESSION NR: AP4028955

trode configurations investigated were plane to plane, point to plane (both positive and negative), and sphere to sphere. The dc breakdown potential usually increased during the course of several discharges, sometimes by as much as a factor of four. This increase was presumably due to a cleansing effect of the discharge. Pump oil vapor was not involved, for the effect was the same with and without the cold trap. This cleansing effect was present, but much less marked, even in the ultrahigh vacuum. The ultimate breakdown potential after several discharges was the same in the ultrahigh vacuum as in the ordinary high vacuum. Except when point electrodes were involved, the dc breakdown potential was proportional to the square root of the gap length. This is in agreement with the hypothesis that the discharge is initiated by transport of electrode material across the gap. This proportionality was observed with steel, silver and copper electrodes, but the actual breakdown potentials were higher with steel and lower with copper than with silver electrodes. Moderate values were found for the pulse factor (ratio of pulsed to dc breakdown potential). For the long (9×10^{-5} sec) pulses the factor was 1.3 and was independent of gap length. Pulse factors up to 1.7 were observed with the shorter pulses. The relation between breakdown potential and gap length calculated by G.A.Farrall (J.Appl.Phys. 33,6,1962) on the hypothesis that the discharge is initiated by transfer of electrode material across the gap, was not confirmed. Sporadic delays up to several

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ACCESSION NR: AP4028955

microseconds were observed, but there was no regularity about these and most of the discharges took place without appreciable delay. Moreover, the relation between gap potential and time was different for delayed discharges from that for undelayed ones. It is concluded that at least two discharge mechanisms are involved. A few exploratory experiments (not described in detail) were performed with very short pulses (5×10^{-8} sec). Pulse factors up to 4 were observed, and it is suggested that very short pulses should be thoroughly investigated. Orig.art.has: 1 formula and 7 figures.

ASSOCIATION: none

SUBMITTED: 10Aug62 DATE ACQ: 28Apr64 ENCL: 00

SUB CODE: PH NR REF SOV: 009 OTHER: 009

Card 3/3

L 45980-66 EWT(l)/EWT(m)/T IJP(c) DS/AT
ACC NR: AP6028626 SOURCE CODE: UR/0057/66/036/008/1499/1500

93

AUTHOR: Stankevich, Yu.L.; Kalinin, V.G.

92
B

ORG: none

TITLE: Enhancement of the breakdown field strength in high pressure two-electrode gaps with single-crystal cathodes

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 8,1966, 1499-1500

TOPIC TAGS: spark gap, dielectric breakdown, gas, nitrogen, argon, hydrogen,pressure effect, single crystal, field emission

ABSTRACT: The authors have measured breakdown potentials at pressures up to 100 atm in nitrogen, argon, and hydrogen of 0.19 mm gaps between plane cathodes and 2 mm diameter hemispherical anodes. The electrodes had no surface roughness discernable under 30 power magnification. The anode material had no influence on the results, and very similar data were obtained with polycrystalline cathodes of different materials. Considerable deviations of the static breakdown potentials from the similarity law were observed in nitrogen at high pressures. The pulse breakdown potentials (40 nanosec pulses with 1 nanosec rise and fall times) were nearly independent of the pressure and corresponded to a field of about 1.2×10^6 V/cm in the gap. The authors hypothesized that the primary electrons responsible for the breakdown arise from field emission from irregularities in the cathode surface, and to test this hypothesis they investi-

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UDC: 537.521.7

L 45980-66
ACC NR: AP6028626

gated single crystal cathodes of tungsten and molybdenum. With the single crystal cathodes the breakdown potentials in nitrogen were equal to those calculated with the similarity law over the full investigated range of pressures. The pulse breakdown potentials were considerably higher than the static ones, and pulse breakdown fields as high as 2.3×10^6 V/cm were observed. It was found that the presence of even inconsiderable adhering layers or of microscopically perceptible dislocations on the surface of the single crystal cathode would reduce the breakdown potentials to values similar to those obtained with polycrystalline cathodes. It is concluded that the deviations of the static breakdown potentials from the similarity law that are observed at high pressures under ordinary conditions are not due to features of the streamer development process, as has been suggested by L.B.Loeb (Proc. Phys. Soc., 60, 561,1948) but to the condition of the cathode surface. The authors thank Professor Ye.M. Savitskiy for providing the tungsten and molybdenum single crystals.

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ACC NR: AP [illegible]001308 SOURCE CODE: UR/0057/66/036/012/2148/2153

AUTHOR: Tarasova, L.V.; Kalinin, V.G.

ORG: none

TITLE: Thermal pulse initiation of high vacuum electric breakdown

SOURCE: Zhurnal tekhnicheskiy fiziki, v. 36, no. 12, 1966, 2148-2153

TOPIC TAGS: dielectric breakdown, high vacuum, spark gap, heat effect

ABSTRACT: The authors have found that breakdown of a vacuum gap can be initiated by the sudden heating of a filament mounted in the space between the electrodes. There are presented experimental results concerning initiation of vacuum discharge between a 40 mm diameter steel disk and a 5 mm diameter steel rod with rounded edges by sudden heating of a 9 mm long 0.04 to 0.2 mm diameter nickel, tungsten, or nichrome wire mounted midway between the electrodes. The apparatus was continuously pumped with an oil diffusion pump to a pressure of 10^{-4} to 10^{-5} mm Hg; no cold trap was used. The filament was heated by the sudden discharge of a 45 μF capacitor charged to 100 to 215 V. The gap lengths are not given; instead, the vacuum breakdown potential in the absence of the triggering thermal pulse is specified. Gaps with untriggered vacuum breakdown potentials up to 70 kV were investigated. Considerable reductions in the breakdown potential were achieved by the triggering device: a gap with a

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normal vacuum breakdown potential of 70 kV could be triggered at potentials as low as 30 kV, and a gap with a normal breakdown potential of 7 kV could be triggered at 0.47 kV. The time delays between triggering pulse and breakdown ranged from a few tens of microseconds to over a hundred microseconds. These long delays limit the possibilities for the practical application of devices (which the authors call "thermotrons") based on thermal pulse initiation of vacuum discharge. Only pulsed heating of the filament would initiate breakdown; continuous heating of the filament did not reduce the breakdown potential of the gap. It is hypothesized the breakdown is triggered by the sudden desorption of gases and vapors adsorbed on the filament. The experimental data are discussed at some length in terms of this hypothesis, which is shown to give a satisfactory account of them. Orig. art. has: 5 figures and 1 table.

SUB CODE: 20 SUBM DATE: 31Dec65 ORIG. REF: 004 OTH REF: 008

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